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Basic Methodical Grounds of Teaching International Students Chinese Field-specific Terms in Technical Institutes of Higher Education (in the Context of Polymer Production)

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Abstract

We look at the problem connected with methods of teaching Chinese field-specific terms to international students in technical institutes of higher education. The basis of our research is represented by Chinese scientists' articles in the sphere of manufacturing polymer. Our research is focused on the solution of problems connected with teaching Chinese field-specific terms to international students in technical institutes of higher education. The task required analysis of teaching and studying issues of field-specific disciplines in Tomsk Polytechnic University, study of terminological processes in Chinese, description of how field-specific terms are adopted from foreign languages into Chinese. Studying the above listed aspects provided a basis for developing a classification of polymer production terms. The way the Chinese language borrows a terminological item is considered when dividing terminological elements into groups for further systematization. We structured our classification of terms and terminological combinations by taking into account the fundamentals of high-molecular composition chemistry for easier understanding of polymer production terminology by teachers and students of technical institutions of higher education.

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Keywords: Term; terminological combination; terminological item; polymer production; methods of teaching.

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1. Introduction

Terminology is the field of linguistics which is subject to foreign language influence and is in constant change. In spite of such difficulties linguists pay attention to term formation processes. Today many people are interested in studying Chinese as there is strong scientific and economic growth in China. Every year more and more people become interested in choosing a future profession connected with the Chinese language. Such a trend demands training of highly skilled teachers.

As technical translation is required by society, some technical institutions of higher education have introduced a diverse range of field-specific disciplines connected with translation. Nevertheless, it often happens that a teacher has no experience in technical translation and has no teaching aids or resources.

Today international education issues are especially discussed. International education requires communication in different languages, so studying foreign languages is a high priority task.

It should be mentioned that studying the terminology of a foreign language is becoming more popular along with accelerated industrial growth all over the world. This is why many universities are widening their academic programs and such field-specific disciplines as translation in the sphere of natural resource management.

Therefore, considering issues of teaching technical terms is an important task for international education, because a fully-fledged exchange of experience on an international scale requires working knowledge of specific terms.

The field of polymer production is becoming extremely important in the world market. As a result, we have a wider range of manufacturing in the short run. Such rapid development in this sphere requires highly skilled professionals who know the terminology of this industry and can provide a fully-fledged exchange of experience. Today, however, there are many problems connected with the process of teaching such professionals working in Chinese. The cause of these problems is the lack of study of Chinese terminology, and teachers' limited awareness of specific scientific spheres.

2. Basic methodical problems of teaching polymer production terms

The subject of our detailed research is polymer production as one of the largest segments in organic synthesis. This industry involves the manufacturing of polyethylene, polystyrene, polypropylene, and etc. Polymer materials and things made of plastic are commonly used both for industry and the household, which proves the importance of developing this industrial sector for any country. Polymer products are mostly used for mechanical engineering, the lighting industry, building, and manufacturing of packaging materials.

In recent years Chinese factories which supply oil refining raw resources have faced with growing demand of their products. This led to a constant increase of loading productive capacity. Therefore, Chinese polymer manufacturers have the ability not only to present its products on the world market but also diversify the range of products'. The modernization of manufacturing has the potential to improve the quality of products and decrease the cost per product unit. At present, China has the scientific and manufacturing experience to provide the ability for non-typical polymer utilization in various units and machines (Reformatskiy, 1967).

Further optimization of manufacturing polymer products all over the world requires cooperation between the best experts for this industry on the world stage. After all, it is well known that the development of any industry is impossible within the bounds of a single country. International cooperation requires teaching new specialists, so taking part in various conferences and internships is necessary. Therefore, an exchange of experience is impossible without the experts' work, and in particular it is translators who have a good knowledge of the basic terminology for the technical field.

In line with the above, many universities implement new disciplines into educational, so students not only get knowledge relating to some scientific field, but also a basic vocabulary in a foreign language which allows them to read the articles of foreign scientists on some subject, and Tomsk Polytechnic University is no exception. Students of TPU also can take the elective course "Special translation," which includes translating in the sphere of natural resource management, IT, engineering and technologies, and electronic instrument engineering.

We have conducted a detailed study of problems a teacher of Chinese as a foreign language can face while teaching translation in the sphere of natural resource management, and took the sphere of polymer manufacturing as

research material for this purpose. The most controversial issues to a teacher are how to translate, understand, and use a term in a scientific text properly.

In our view, the lack of such highly specialized materials\ as dictionaries and research papers on terminology in Chinese highlights the issues faced by the teachers of certain subjects.

It is noteworthy that the translation of scientific and technical texts from Chinese requires a good knowledge of highly specialized terminology of both the original and target languages and often requires the help of the experts on this subject, because many terms are not set in dictionaries. Presently, there are very few highly specialized dictionaries while most of them are still in the process of creation. Moreover, they contain translation errors as well, going from Russian to Chinese and from Chinese to Russian.

The above features of the educational system create the lack of translation material, dictionaries and methodological guidelines on subjects which are very difficult but important for future translators. Virtually the only widely available source for teachers and students is online dictionaries, but they are ineffective in scientific translation. In most cases, an online dictionary does not have a precise translation of a term. Frequently an online dictionary only suggests an English translation equivalent; less often it suggests a term definition, and almost never gives a translation into other languages.

Thus, a teacher who is not aware of highly specialized terminology in Chinese and Russian has to come up with his own translation of a precise scientific concept, look through scientific articles on this subject in two languages, and ask experts, which is the most certain, but not always possible. It is necessary to note that there is a possibility to guess the meaning of the word by the parts of a character but the specific nature of term is such, however, that the term is fixed and free translation is not allowed. More detailed research on the subject is the teacher's ultimate strategy, but when the teacher does his own study of terminology he may does mistakes, so it does not help to manage the translation but misleads not only the teacher but students also.

3. The study of the borrowing procees of foreign terms into Chinese

To solve the problem of accurately translating Chinese terms in the process of teaching such a discipline as translation in the sphere of natural resource management, we have highlighted the next series of tasks: the study of term formation processes, in particular the process of borrowing terms from other languages; the separation of considered terms into semantic groups; and further classification of concepts, that provides terms with a uniform composition. During the analysis of the selected Chinese terminological base, we have determined common features which are unique to groups of terms with shared meanings and senses. Furthermore, we have identified proper ways of creating and perfecting terms. In our opinion, accomplishing these tasks makes the process of teaching technical translation easier for students.

Following this pattern, we began our research with analyzing linguistic articles dedicated to the issue of terminology in Chinese. As we know, Chinese is an isolating language. That means words neither form nor inflect. All relations between words are shown by their juxtaposition or by means of functional words. The main reason for this is the longstanding isolation of Chinese civilization from foreign influence. Due to this, studying Chinese terminology is interesting, but extremely difficult.

Many linguists research modern Chinese terminology, in spite of all the difficulties which can appear during fundamental theoretic analysis. For example, foreign scientist Carsten Mende in one of his works emphasized the role of English in Chinese language (Carsten Mende, 2010), and Russian scientists A.V. Superanskaya, N.V. Podolskaya, and N.V. Vasilyeva in their studies appeal to the issue of special vocabulary in general terminology theory (Superanskaya, Podolskaya, & Vasilieva, 1989; 2008). Theoretical works by Superanskaya, Podolskaya, and Vasilyeva helped Chinese researcher Zheng Shu Pu to establish the Harbin terminological school. Zheng Shu Pu also emphasizes and appreciates the importance of the theory developed by the Russian terminological school in the development of Chinese terminology. This work involves the cooperation of Russian, Chinese, and other foreign researchers who deal with problems of terminology.

The above-listed authors say that systematization is an important feature of terminological systems of any language, systematization is formed by classification of the concepts and it implements in a consistent construction of terms. Thus, we turn to the existing classifications of Chinese terms. Such authors as V. I. Gorelov, A.L. Semenas and I.V. Kochergin gave their vision of term formation by structuring terminological units by the method

of borrowing. Their classifications are useful for every sphere of science, which means all terms in Chinese fall under their classification. In our research we want to develop a classification of polymer production terms which meets the needs of teachers and students. For our study the classification of Kochergin was chosen because it is much simpler than other classifications, due to the fact that the criteria for determining the method of borrowing is much broader than in the classifications of other authors. It avoids controversial issues in the division of terms into groups according to the method of borrowing. Let us examine his classification, supplemented with examples of terms from polymer industries (Kochergin, 2012). Kochergin recognizes three types of borrowing: complete, phonetic and semantic.

The group of complete borrowing includes terms borrowed entirely from the original language, when the expression plane coincides with the content plane. Kochergin writes that such terms are comparatively infrequent and often are units of measurement, though some examples in a special vocabulary can be found. This is why we assume that among the selected terms there will be many that are formed through full borrowing. For example, 聚二甲基硅氧烷jùèrjiǎjīguīyǎngwán - «polydimethylsiloxane» where 聚jù - «poly», 二甲基èrjiǎjī - «dimethylsiloxane».

The group of phonetic borrowing includes international terms which are transmitted by transliteration, their other name - "phonetic calques". For example, 尼龍nílóng - nylon. In addition, Kochergin believes that hybrid borrowing also belongs to this type. Hybrid borrowing consists of two parts: a purely phonetic calque and a semantic dependence. For example, 异戊橡胶yìwùxiàngjiāo - «isoprene rubber» where 异yì is a phonetic borrowing of prefix «iso», 戊wù - "the fifth periodic sign", meaning that there is a chain of five atoms of hydrogen, and 橡胶xiàngjiāo - «rubber».

According to Kochergin semantic borrowing includes those terms in which the content plane does not coincide with the expression plane. In such terms the expression plane indicates any properties or characteristics of the term borrowed. For example, 聚乙烯醇缩甲醛jùyǐxīchúnsuōjiǎquán - «polivinilformaldegid» where 聚乙烯醇jùyǐxīchún - «polyvinyl alcohol», 缩suō - «connect», 甲醛jiǎquán - «formaldehyde». In this case, the emphasis is placed on the polymer structure, wherein the oxygen bridge connects (缩suō) the first and the third carbons in the chain.

Thus, the classification of terms by I.V. Kochergin formed the basis of our research, since working with it we were able to cover all of the material obtained during the sampling of terms from the articles written in Chinese about the production of polymers (丁亮《常见聚合物的合成》, 丁亮《聚苯乙烯工艺设计》, 林宥嘉《高聚物》(邦张《聚合物燃烧特性表》).

Translation of terms in Russian has been verified by Krivtsova Ksenia Borisovna, a chemical engineer a research engineer of the Institute of Petroleum Chemistry of the Siberian Branch of the Russian Academy of Science.

In the current study, the focus was on the terminological items of the subsector of manufacturing polymeric products, formed by full borrowing, when the planes of the content and expression of words or phrases are identical, and by semantic borrowing, when during transition from language to language the content plane of the term is the same, and the difference is in the expression plane.

According to this classification, terminological items selected during the study of Russian scientific articles, were divided into terms and terminological combinations. A term we understand as a word that denotes a special item or a scientific concept, which is describing concrete definition and have certain place in the terminological system (Komarova, 1991). For example, 聚碳酸酯jùtànsuānzhǐ - polycarbonate, where 聚jù - «poly», 碳酸tànsuān - «carbonic acid», 酯zhǐ – «compound ester».

A terminological combination we understand to be a the multi-component, formed by separate components, but semantically coherent combination consisted of two, three or more combined elements (Tatarinov, 1996). So, a terminological combination, unlike a term, includes several terminological items. For example, 丙烯酸酯-丙烯酸酯-苯乙烯共聚物bǐngxīsuānzhǐ-bǐngxīsuānzhǐ-běnyǐxīgòngjùwù «copolymer of diacrylate and styrene» where 共聚物gòngjùwù - «copolymer», 苯乙烯běnyǐxī - "styrene», 丙烯酸酯bǐngxīsuānzhǐ - acrylate. In this example, the "diacrylate" refers to two molecules of acrylate, and Chinese term reflects this sense.

It is worth noting that in linguistic studies terminological combination is not given much attention. Most scientists, for example, Golovin, Kobrin, Superanskaya, Besse, Felber, mean by "term" a word and phrase, whereas we believe that the concept of "term" and "terminological combination" should be distinguished, as this will help to

structure the terminological material in order to resolve the problems of teaching Chinese terminology to Russian students in technical universities.

When translating technical texts, terminological combinations are particularly difficult, as they are not recorded in dictionaries, in contrast to terms, and as a consequence, in the translation of terminological combinations the meanings of the components are taken into account. Therefore, knowledge of vocabulary established in the target language and knowledge of the natural connections of individual lexical units is a necessary condition for a successful act of translation. Unfortunately, to cope with the presentation of the material successfully, the teacher should have a wealthy experience in the translation of scientific technical texts, which is not always possible.

As mentioned above, the basis of our study is based on four Chinese-language articles, each contain 9 pages in length (丁亮《常见聚合物的合成》, 丁亮《聚苯乙烯工艺设计》, 林宥嘉《高聚物》, 邦张《聚合物燃烧特性表》) on the industry of polymer production. Using the method of continuous sampling we made an analysis of 40 terminological items. During the study, an analysis of the selected terms was performed, the boundaries between concepts were delineated, such as between "term" and "terminological combination" Moreover, on the basis of the classification given by Kochergin, the existing terminological elements were analyzed, which showed that the majority of the terms in the Chinese language came from international terminology through full and semantic borrowing. In our opinion, in order to facilitate the understanding of a terminological unit, we need to first divide terms into international and non-borrowed. International terms do not require further explanation, we can find them in dictionaries fairly easy, while non-international terms cannot be found.

Thus, the selected terms have been separated by the presence or lack of borrowing. Furthermore, a more detailed division of groups of terms, based on the manner of borrowing, was made. This analysis was carried out to understand the structure of terms and terminological combinations. The results of the study are presented in Table 1. The origin of polymer production terms in Chinese.

Table 1. The origin of polymer production terms in Chinese.

Terminological item	Name	Complete borrowing	Sematic borrowing
Term	丁基橡胶dīngjīxiàngjiāo butyl rubber	+	
	丁苯橡胶dīngběnxiàngjiāobutylbenzene rubber	+	
	丁腈橡胶dīngjīngxiàngjiāobutylnitrile rubber	+	
	乙丙橡胶yǐbǐngxiàngjiāo ethylene-propylene rubber		+
	顺丁胶shùndīngjiāo butadiene rubber		+
	氟塑料fúsùliàofluoroplastic	+	
	醋酸纖維cùsuānxiānwéi cellulose acetate		+
	腈纶jīnglún nitrile fibre	+	
	涤纶dílún polyether		+
	均聚物jūnjùwùhomopolymer		+
	单烯烃dānxītīngmonoolefin	+	
	二烯烃èrxītīngdiolefin	+	
	共聚物gòngjùwù copolymer	+	
	聚乙烯jùyǐxī polyethylene	+	
	聚丙烯jùbǐngxī polypropylene	+	
	聚氯乙烯jùlǜyǐxī polyvinyl chloride	+	
	聚苯乙烯jùběnyǐxīpolystyrol	+	
	聚甲醛jùjiǎquánpolyformaldehyde	+	
	聚异丁烯jùyìdīngxīpolyisobutylene	+	
	聚烯烃jùxītīng polyolefin	+	
	硅橡胶guīxiàngjiāo silicon rubber	+	
	聚酰胺jùxiān'àn polyamide	+	
	聚已内酰胺jùyǐnèixiān'ànpolycaprolactam	+	
	聚二甲基硅氧烷jùèrjiǎjīguīyǎngwán polydimethylsiloxane	+	
	聚醋酸乙烯酯jùcùsuānyǐxīzhǐpolyvinylacetate		+
	聚乙烯醇缩甲醛jùyǐxīchúnsuōjiǎquánpolyvinylformaldehyde		+
	聚鄰苯二酸二烯丙酯Jùlínběnèrsuānèrxībǐngzhǐpolydiallyl phthalate		+

	聚丙烯腈jùbǐngxījīngpolyacrylonitrile	+
	聚对苯二甲酸乙二醇酯jùduìběnèrjiǎsuānyǐèrchúnzhǐ polyethylene terephthalate	+
	聚碳酸酯jùtànsuānzhǐ polycarbonate	+
	聚甲基丙烯酸甲酯jùjiǎjībǐngxīsuānjiǎzhǐpolymethyl methacrylate	+
	聚氨酯jù'ānzhǐ polyurethane	+
	聚四氟乙烯jùsìfúyǐxīteflon	+

Terminological combination	三聚氰胺甲醛树脂sānjùqíng'ānjiǎquánshùzhī melamine-formaldehyde rubber	no borrowing
	丙烯酸酯-丙烯酸酯-苯乙烯共聚物bǐngxīsuānzhǐ-bǐngxīsuānzhǐ-běnyǐxīgòngjùwù copolymer of diacrylate and styrol	
	聚2,6-二甲基苯醚jù 2,6-èr jiǎjīběnmí poly- 2,6-dimethylphenol ester	
	高密度聚乙烯gāomìdùjùyǐxī high-density polyethylene	
	低密度聚乙烯dīmìdùjùyǐxī low-density polyethylene	
	线性低密度聚乙烯xiànxingdīmìdùjùyǐxī linear low-density polyethylene	
	氯化聚乙烯lǜhuàjùyǐxī chlorinated polyethylene	

The group of terminological items of semantic borrowing is less by only five terms than the complete borrowing group, which included 19 terms, whereas in the group of semantic borrowing includes 14. There are a few more terms formed by full borrowing due to the fact that some of them have already come into the Chinese language, and their component morphemes are useful for creating new terminological items. The field of chemistry has provided for the formation of the basic chemical terms. Constituent morphemes serve to create terms of high molecular composition chemistry. Entering Chinese, foreign lexical units were subjected to re-registration in accordance with the internal laws of Chinese language development. Terminological elements formed by semantic borrowing are extremely diverse and numerous. The reason is that it is not always convenient to borrow the term fully, as some terminological items are difficult to borrow, because there are no forming elements in the Chinese language which can provide full term borrowing. This leads to the idea that the very first industrial terms were formed by semantic borrowing. They moved into the recipient language, and later on their basis formed the terms made by the process of full borrowing, or even established terms made by semantic borrowing were replaced by the same, fully borrowed, term.

Referring to the terminological combinations, it is impossible to declare that they are borrowed terminological items. As mentioned above, they are not recorded in the dictionary that would provide grounds to believe that they are readymade in the language. Native Chinese linguistic components and borrowed terms both act as components of phrases.

In the examined Chinese language articles 7 terminological combinations are found, whose components are terms formed by both complete and semantic borrowing, as well as by purely Chinese lexical units. The table shows that terms formed by complete borrowing, are less bulky in comparison with the terms formed by semantic borrowing. This is proved by the fact that in full borrowings equivalent lexical units of Chinese language are used. For example, consider the following terms: 聚乙烯jùyǐxī - «polyethylene" where 聚jù in complex chemical terms corresponds to the meaningful affix "poly»,乙烯yǐxī - «ethylene." Similar examples are聚丙烯jùbǐngxī - «polypropylene»,聚氯乙烯jùlǜyǐxī - «polyvinyl chloride»,聚苯乙烯jùběnyǐxī - «polystyrene», 聚甲醛jùjiǎquán - «polyformaldehyde»,聚异丁烯jùyìdīngxī - «polyisobutylene»,聚烯烃jùxītīng - «polyolefin»,聚酰胺jùxiān'àn - «polyamide»,聚已内酰胺jùyǐnèixiān'àn - «polycaprolactam", in which 聚jùIt corresponds to the prefix "poly", and the second component is丙烯bǐngxī - «propylene",氯乙烯lǜyǐxī - «vinyl chloride»,苯乙烯běnyǐxī - «styrene»,甲醛jiǎquán - «formaldehyde»,异丁烯yìdīngxī - «isobutylene»,烯烃xītīng - «olefin»,酰胺xiān'àn - «amide»,已内酰胺yǐnèixiān'àn - «caprolactam".

The terms formed by semantic borrowing are more complex, and if a translation of the term is not in the dictionary, as often happens, the process of translating the term is much more complicated, because it is necessary to

have knowledge in the field of science and production. For example, consider the following terms: 聚对苯二甲酸乙二醇酯jùduìběnèrjiǎsuānyǐèrchúnzhǐ - «polietilenterftalat" where 聚jù - «poly»,对duì - «symmetric», 苯běn - «Benzene», 二èr - «two», 甲酸jiǎsuān - «formic acid », 乙二醇yǐèrchún -« two-atom alcohol »,酯zhǐ－“compound ester”. To understand why the above-mentioned hieroglyphs were used in this term, it is necessary to look at and understand the composition of the polymer. Polymerization of the ester bond explains the following items: 酯zhǐ - “compond ester” within the polymer molecules are benzene (苯běn), a dihydric alcohol (乙二醇yǐèrchún), two parts of formic acid attached to the benzene (二èr, 甲酸jiǎsuān) moreover the benzene molecule is symmetrical. It is represented by the hieroglyph 对duì - «symmetrical». Another very interesting term is 涤纶dílún - «polyether» where 涤dí - «wash, clean», 纶lún «twisted thread, fibre". It is not a secret that nylon stockings are made of polyether. Why, then, if it is a semantic borrowing is there no reference to stockings in the Chinese term? The point is that the polyether is used for the production of nylon stockings: it is a polymer of high pressure and the method of its manufacturing provides elasticity, shine, and other characteristics sought after in such a product. At the same time, polyethers obtained without high pressure and in easier conditions are used for the manufacture of household items such as washcloths, sponges for washing dishes, special napkins for cleaning around the house, and so on, so for this term the corresponding character 涤dí - "wash, clean" is presented.

As for the terminological combinations, as mentioned above, their components are as purely Chinese and borrowed as well. Consider the example of the following terminological combination: 高密度聚乙烯gāomìdùjùyǐxī - «high density polyethylene", where 高密度gāomìdù - «high density, high concentration», 聚jù - «poly», 乙烯yǐxī - «ethylene", that is, "polyethylene" is an international term used in polymer production, while the "high density" is a general term. A similar analysis is applicable to the next term低密度聚乙烯dīmìdùjùyǐxī - «low density polyethylene", where 低密度dīmìdù - «low density, low concentration», 聚jù - «poly», 乙烯yǐxī - “ethylene”, which is an international term as well.

4. The classification of terminological items in Chinese

On the basis of the 40 terminological elements analyzed and the characteristics of their borrowing identified, we would like to offer a classification of the terms and terminological combinations that will not only continue the study of this brunch of industry, but can also help in the preparation of educational material on the subject.

The selected terminological items can be divided into the following groups:

- indication of the material of which the product is made;
- formation with the help of a meaningful affix.

These aspects were chosen because in Macromolecular Chemistry prefixes indicate a specific class of compounds, and the choice of material is important for the production of certain products. Apart from that, these groups in their turn are divided according to type of prefix and kind of material. The results of the study and classification of selected terms are presented in Table 2. The classification of Chinese terms in the field of polymer production.

Table 2. The classification of Chinese terms in the field of polymer production.

Group name	Term	Terminological combination
Material		
rubber	• 丁基橡胶dīngjīxiàngjiāo butyl rubber • 丁苯橡胶dīngběnxiàngjiāobutylbenzene rubber • 丁腈橡胶dīngjīngxiàngjiāobutylnitrile rubber • 硅橡胶guīxiàngjiāo silicon rubber • 乙丙橡胶yǐbǐngxiàngjiāo ethylene-propylene rubber • 顺丁胶shùndīngjiāo butadiene rubber	
plastic	• 氟塑料fúsùliàofluoroplastic	
fiber	• 醋酸纖維cùsuānxiānwéi cellulose acetate • 腈纶jīnglún nitrile fiber • 涤纶dílún polyether	
resin		• 三聚氰胺甲醛树脂sānjùqíng'ānjiǎquánshùzhī melamine-formaldehyde rubber
Prefix		
homo-	• 均聚物jūnjùwùhomopolymer	
mono-	• 单烯烃dānxītīngmonoolefin	
di-	• 二烯烃èrxītīngdiolefin	
co-	• 共聚物gòngjùwù copolymer	• 丙烯酸酯-丙烯酸酯-苯乙烯共聚物bǐngxīsuānzhǐ-bǐngxīsuānzhǐ-běnyǐxīgòngjùwù copolymer of diacrylate and styrol
poly-	• 聚乙烯jùyǐxī polyethylene • 聚丙烯jùbǐngxī polypropylene • 聚氯乙烯jùlǜyǐxī polyvinyl chloride • 聚苯乙烯jùběnyǐxīpolystyrol • 聚甲醛jùjiǎquánpolyformaldehyde • 聚异丁烯jùyìdīngxīpolyisobutylene • 聚烯烃jùxītīng polyolefin • 聚酰胺jùxiān'àn polyamide • 聚已内酰胺jùyǐnèixiān'ànpolycaprolactam • 聚二甲基硅氧烷jùèrjiǎjīguīyǎngwán polydimethylsiloxane • 聚醋酸乙烯酯jùcùsuānyǐxīzhǐpolyvinylacetate • 聚乙烯醇缩甲醛jùyǐxīchúnsuōjiǎquánpolyvinylformaldehyde • 聚鄰苯二酸二烯丙酯Jùlínběnèrsuānèrxībǐngzhǐpoly diallyl phthalate • 聚丙烯腈jùbǐngxījīngpolyacrylonitrile • 聚对苯二甲酸乙二醇酯jùduìběnèrjiǎsuānyǐèrchúnzhǐ polyethylene terephthalate • 聚碳酸酯jùtànsuānzhǐ polycarbonate • 聚甲基丙烯酸甲酯jùjiǎjībǐngxīsuānjiǎzhǐpolymethyl methacrylate • 聚四氟乙烯jùsìfúyǐxīteflon • 聚氨酯jù'ānzhǐ polyurethane	• 聚2,6-二甲基苯醚jù 2,6-èr jiǎjīběnmí poly- 2,6-dimethylphenol ester • 高密度聚乙烯gāomìdùjùyǐxī high-density polyethylene • 低密度聚乙烯dīmìdùjùyǐxī low-density polyethylene • 线性低密度聚乙烯xiànxìngdīmìdùjùyǐxī linear low-density polyethylene • 氯化聚乙烯lǜhuàjùyǐxī chlorinated polyethylene

Based on the values of selected term- units, the following subgroups were defined. For example, the group where the material is a fundamental characteristic "rubber", "plastic", "fiber", "resin" was highlighted. Such prefixes as "homo", "mono", "di-", "co-" "poly-" were included in the group where the prefix is important.

Based on the distribution of selected terminological items into two groups, a quantitative analysis was made that showed that there are many more terms and terminological combinations formed with prefixes , than there are terminological items containing the name of the material of which the final product was made. This is because the prefixes denote a separate class of compounds and, therefore, a material. It is logical that in articles devoted to the production of polymer products a greater number of terminological elements will have a class of polymers, so the prefix "poly-" is leading. This prefix has a basic meaning, namely, it represents a class of chemical compounds of high molecular weight, which consist of a plurality of structurally different or identical repetitive atomic groups. In

our study there are many terminological items formed using the prefix "poly-": 19 terms and 5 term combinations, which make it the largest subgroup.

In the considered articles there are far fewer terms formed with other prefixes such as "di» (二烯烃èrxītīngdiolefin), "co-» (共聚物gòngjùwù copolymer), "mono» (单烯烃dānxītīng mono-olefin), "homo - »(均聚物jūnjùwùhomopolymer). We believe that the meaning of these affixes is the reason that there are only 5 such terminological items.

In regard to the terminological items, in which emphasis is placed on the material of which the product was made, on the basis of the studied literature and identified subgroups it was found that rubber is represented by 6 terms (顺丁胶shùndīngjiāobutadiene rubber, 丁基橡胶dīngjīxiàngjiāo butyl rubber and others.), Plastic - 1 term (氟塑料fúsùliàofluoroplastic) fiber - 3 terms (醋酸纖維cùsuānxiānwéi cellulose acetate, 腈纶jīnglún nitrile fiber, 涤纶dílún polyether) resin - 1 terminological combination (三聚氰胺甲醛树脂sānjùqíng'ānjiǎquánshùzhī melamine formaldehyde rubber).

I would like to emphasize that this classification may become more complicated in the future, as we plan a separate study of terms formed by the prefix "poly-" for a more detailed look at the formation of polymers' names in Chinese.

At the current stage of research, we can draw the following conclusions: in the field of polymer production more terms are found than terminological combinations. It could be explained by the fact that to accelerate the development of international cooperation in the production of polymer products, it is much easier to borrow a term, than to develop a new terminological system. It is also worth mentioning that under the influence of English and an international vocabulary, where the prefix "poly-" has already become an important part of the terminology of the polymers manufacturing industry, this prefix indicates a class of chemical compounds. Processes of term formation in Chinese came about through the appearance of the prefix "poly" - by changing the verb 聚jù «to come together." In addition, the origin of the word "polymer", from the Greek, also had an impact on Chinese. πολύ- - «a lot» and μέρος - «a part of." Such a strong prefix base and the etymological definition of the term "polymer" (a high-molecular compound consisting of a plurality of different or identical repetitive structures of atomic groups) has given the development of Chinese the productive affix "poly-." In this regard, many terms for a particular polymer are formed through complete borrowing.

Thus, Table 2, with further studies of Chinese scientific articles, can be renewed and updated, both in terms of adding new terminological elements, and in terms of forming new groups or subgroups. Such analysis and classification of terminological items of polymer production is the beginnings of terminological material, whose goal is the improvement of education of foreign students in technical universities. The classification proposed in our work divides the terms into two meaningful groups, which are based either on meaningful affixes which define a class of compounds, or on the name of the basic material of the manufactured product. Combining terms in separate groups follows the principles of consistency and uniformity in the construction of terms in specialized dictionaries.

5. Conclusion

In conclusion, it should be mentioned that since the middle of the last century there has been a need for deeper theoretical understanding of the terminology of modern the Chinese language from a linguistic point of view. Modern scientific and technology development, computerization of all areas of human activity, and active Chinese integration into the world economy has caused a significant restructuring of the conceptual system of scientific disciplines and the emergence of new fields of knowledge. The number of new concepts requiring new terminology has also increased. According to this linguistic movement scientists have to conduct new research on Chinese terminology and its classifications.

In connection with the growing role of China on the global stage, learning Chinese is gaining popularity. Recently the knowledge of special Chinese vocabulary has become relevant in view of the rapid scientific and technology development of the People's Republic of China, which is why many technical universities are introducing disciplines related to technical translation. As this teaching area has very few methodological materials, one of the most important issues is in the area of teaching highly specialized terms in the Chinese language to international students in technical universities.

In this article we propose a solution to the problem of teaching special vocabulary in the sphere of polymer manufacturing based on the works of such linguists as Kochergin, Reformatsky, and etc. First we analyzed whether the selected terms were borrowed from the another language. According to the analysis, most terms are international and formed by means of full and semantic borrowing. In turn, terminological combinations are formed by combination of Chinese morphemes and components borrowed from other languages. The international terms are much easier to understand because they are already set in the dictionary and in regard to teaching this material to students, all that is need is to emphasis the strategy of borrowing. As for the terminological combinations, they are more difficult to study because they are not set in terminological dictionaries and we cannot confirm they are borrowed. Frequently some elements of terminological combinations are represented by borrowed international units and other elements which are Chinese morphemes. The next step was to determine common sense characteristics of the analyzed terms. On the basis of the main principles of high-molecular compound chemistry, we drew attention to the meanings of compound morphemes and, as a consequence, we have established the principle that the morphemes forming the terms convey the polymer class or the materials the products are made of.

Therefore, the classification that we suggest makes it possible to combine the terminological elements of polymer production into specific groups, which gives the system order. For the teacher who does not have experience in technical translation it would be easier to use a previously classified material than to attempt to translate on his own. Therefore, continued research on term formation in Chinese is important for both linguistic and teaching methodology.

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